MISSION OPERATIONS DIRECTORATE
FLIGHT DIRECTOR OFFICE

STS-102/STAGE 5A.1/ISS
INCREMENT OPERATIONS

FLIGHT READINESS REVIEW

February 27, 2001

DA8/J. W. Bantle

STS-102/Stage 5A.1/Increment Operations

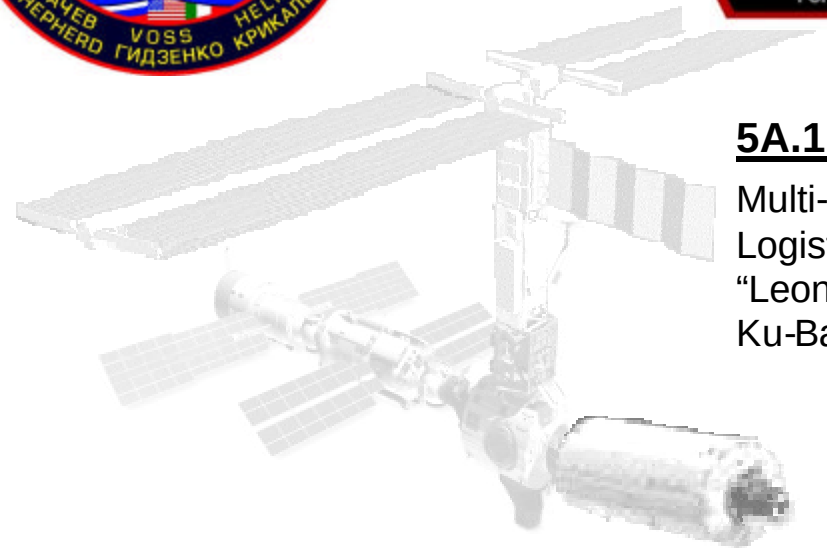
- STS-102 Mission Operations
  - Mission Operations – Mission Firsts
  - Network
  - USA Flight Operations
  - MOD
- Flight Rules
  - All Flights – No Updates
  - STS-102/5A.1 Flight Specific
- Standard Special Topics
  - STS-102/5A.1 Ascent Performance
- Special Topics and Open Work
  - Drag thru Cable
  - Direct Insertion to 122 nm
- Certification
- Readiness Statement

STS-102/5A.1 MOD Mission Firsts

- Priorities:
  - Crew Rotation
  - Prep for SSRMS Arrival (Lab Cradle Assembly, Rigid Umbilical)
  - Outfit US Lab/Re-supply (KU band, CHeCs, HRF)
  - Delivery of On-orbit Spares (Ext Stowage Platform, Pump Flow Control System)
- Flight Firsts Include
  - DI to 122
  - "TORVA" Rdz (+Vbar)
  - Docking to PMA 2 on US Lab
  - Docking with ISS under USOS attitude control
  - 3 person crew rotation and 3 person crew return
  - 2 camera SVS operations
  - MPLM (thermal, life support, etc… -- rules, procedures, training) (ASI)
  - Rack Transfer (7 racks: 2 DDCU, 2 MSS, Av Rack 3, CHeCS, HRF)
  - Re-supply Stowage Rack and Platform Operation
  - ISS Payload Delivery and Operation (HRF) (MSFC P/L Operations)

STS-102 ISS 5A.1
Flight Readiness Review

Networks



5A.1

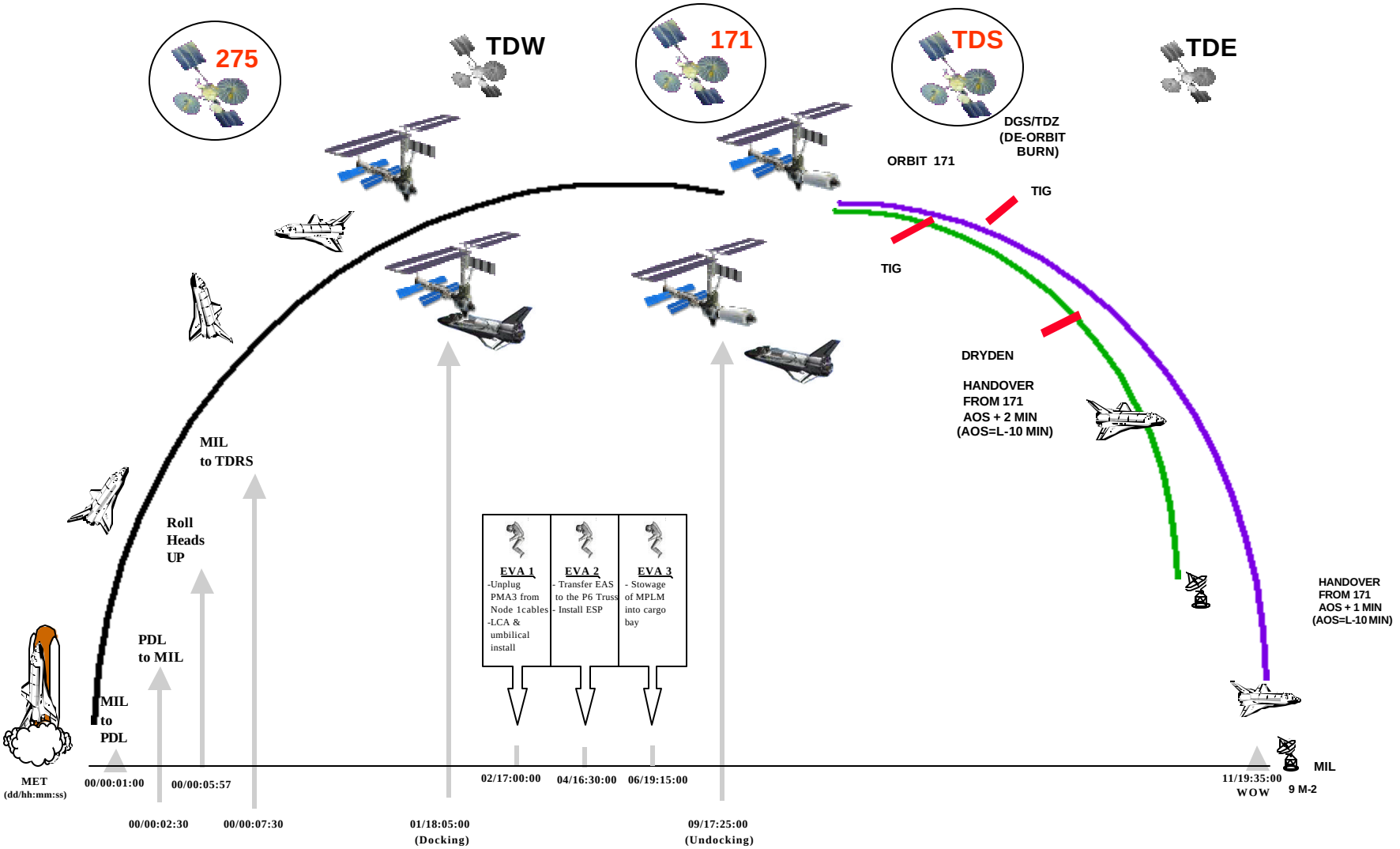
Multi-Purpose Logistics Module "Leonardo"; Ku-Band Activation

Agenda

- Integrated Network Activity
- TDRSS Constellation
- Other SN Supported Launches
- STS-98/ISS 5A Anomaly
- Network Activities
- Significant Changes
- Configuration Management
- Critical Periods

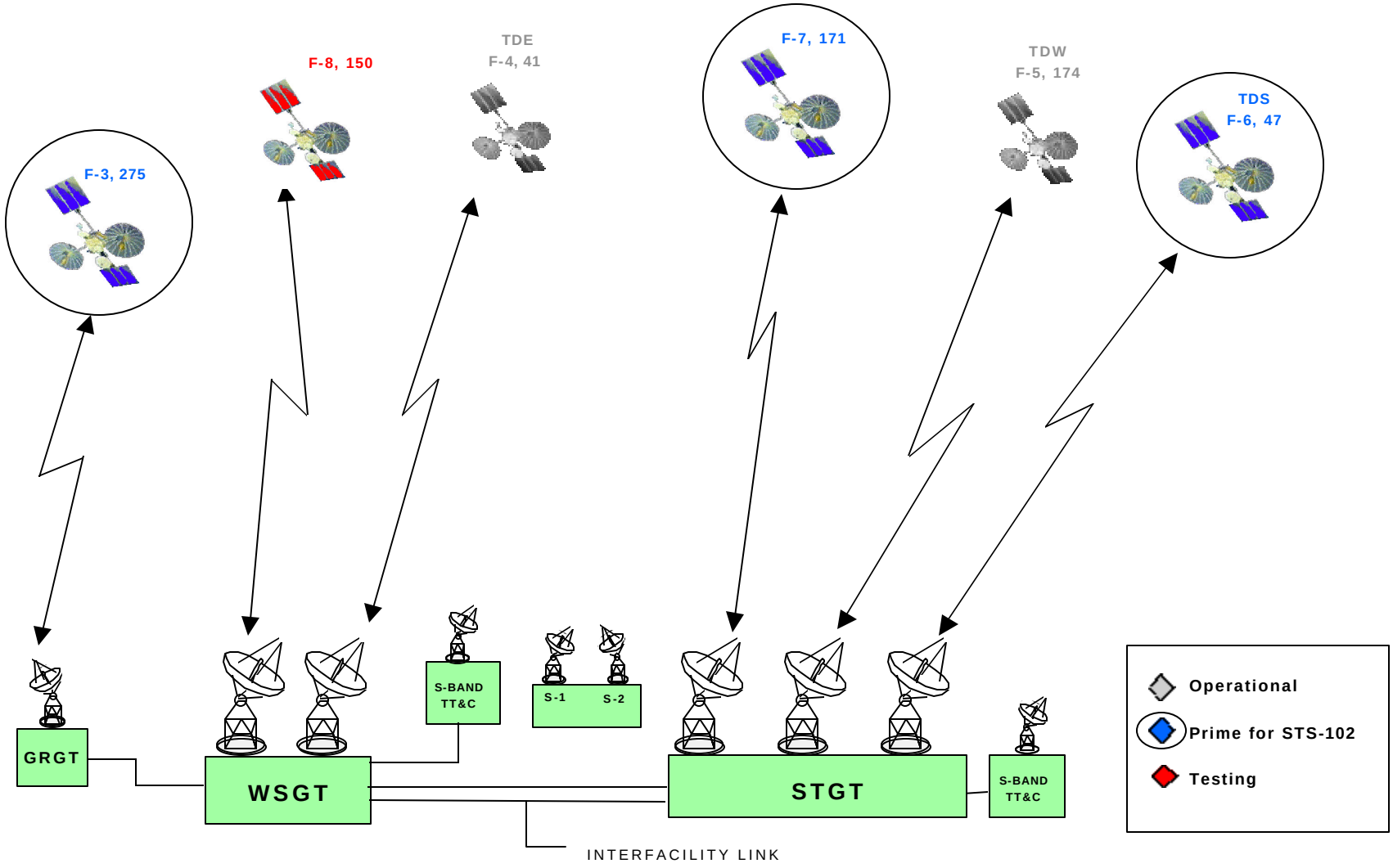
Ted Sobchak
Network Director
GSFC/Code 450
February 2001

STS-102/ISS 5A.1 Integrated Networks Activity



STS-102/ISS 5A.1 FRR
Mission Services

TDRSS Constellation



Other SN Supported Launches

- The Sealaunch (SL-7) mission is planned for March 18 and uses TDRSS resources.
  - There are no SN support conflicts with STS-102 as a result of the SL-7 mission

STS-98/ISS 5A Prelaunch Anomaly

- NISN Line experienced trickling errors that impacted PDL S-Band
  - Service restored 12 hours prior to launch support
  - Not a Launch Hold item
- PDL UHF A/G or S-Band required for high inclination launches
  - UHF A/G is a separate line interface to PDL

Network Success and Upcoming Support

- Ongoing ECS support since December 1998 without support or service issues
- More recently, ISS S-Band LDR operations successfully supported (report period December 9, 2000 - January 31, 2001)
  - SSAF/SSAR: 14,207 minutes of service
  - A total of 593 events were supported
- ISS S-Band HDR activation and operations supported since STS-98/ISS 5A Mission
- ISS Ku-Band Activation planned for the STS-102/ISS 5A.1 Mission

Network Activities

- ISS Ku-Band activation

Test Event	Location	Year	Notes
Development, Test, & Verification Model (DVTM) Testing	GSFC	May 1996	Low signal level on video and payload data performance
Z-1 Truss Qualification Model (QM) Testing	Boeing Seattle	Jan/Feb 1998	No anomalies; previous concern corrected by vendor
JSC-ESTL QM Testing	JSC	Aug 1999	No anomalies
Multi-Element Integrated Testing (MEIT)	KSC	Jan 2000	No anomalies

- Potential for JSC to schedule three (3) SA Services several times a day
  - Shuttle, ECS HDR, S-Band CMD/TLM
- SN resources may not be able to support this request at all times
- Service may be provided by using Virtual Spacecraft support services
  - Shuttle (Ku-Band) and ISS (ECS) share one TDRS SA.
- New Operational Network Services for ISS 5A.1
  - 50 Mbps Return Link Data (which includes line outage recording)
  - 3 Mbps Forward Link Data
  - Video Distribution

Network Activities

- **ISS 50 Mbps Return Link**
  - Circuit installed on November 21 for data distribution from WSC to JSC & MSFC
  - Successfully completed acceptance testing and Network data flow testing with ISS 50 Mbps tapes

- **Line Outage Recorders**
  - "New" recorders in place and tested at WSC to support ISS interface
    - 50 hour retention requirement for tapes
    - Playbacks will occur on the same interface as the realtime data.

Network Activities

- 3 Mbps Forward Link
  - All testing through MEIT was successfully supported using PTP software
    - Use of SCD software provides improved stability and performance
    - Extensive SCD testing has been conducted to verify performance
  - Final configuration is the SCD software on prime and redundant systems
- Video Distribution
  - Video broadcast mode interface from JSC to MSFC, Ames, Glenn, and CSA
  - Testing successfully completed Feb 1, system is operational

Network Activities

- **Ku-Band Acquisition Backup**
  - GSFC developed a backup capability for the standard JSC acquisition procedures using an ISS orbit solution based on one-way tracking data via TDRS from the ISS S-Band link.
- **VHF Network Support**
  - All view period support ends with the activation of Ku-Band
  - Future passes will be scheduled only on request

Significant Changes

- **Space Network (WSC)**
  - Installation of 3 Mbps ISS Forward Link Capability
  - ISS 50 Mbps Realtime return Telemetry, Record and Playback Capability

- **Flight Dynamics Facility**
  - Acquisition Data Generator Hardware Reconfiguration for STS-102
    - Follows successful software use since STS-97
    - Prime system restricted to Human Spaceflight support
    - Backup system assigned to HSF and ELV support

- **NISN**
  - All ISS voice and data circuit requirements are in place

Significant Changes

- **Ground Network**
  - **MIL/ PDL: No changes for mission support**
  - **WLPS: Upgraded C-Band Radar Transmitter (WLPC)**
- **DFRC**
  - **C-Band Radars**
    - **New interface to radars will be used for STS-102 support**
    - **Replaces obsolete interface**
  - **S-Band Systems**
    - **Digital recorders will be prime on STS-102**
      - **Backup for STS-98 and STS-97**
- **ER Radars and AFSCN**
  - **No mission impacting changes. Sites available for support.**

Configuration Management

- **Freeze Policy**
  - **Integrated Network freezes are imposed as follows**
    - **MIL/PDL - Prior to the TCDT**
    - **SN, BDA, WLPS, DFRC, FDF - Prior to the Space Network Verification/Validation**
    - **AFSCN RTS and remaining NISN resources - Launch minus 5 days**
  - **Exemptions must be approved prior to implementation Critical Period Restrictions**
  - **Critical periods for Space Shuttle and ISS will be identified prior to the mission and documented in a "Mission Critical Periods Interim Support Instruction (ISI)"**
  - **Maintenance and testing restrictions are imposed for all network elements during mission-critical periods**

Generic Shuttle/Station Critical Periods

Event	*Start*	*Stop*
Launch rendezvous mission	Launch -4 hours	Last rendezvous burn on FD1
Launch non-rendezvous mission	Launch -4 hours	"Go for Orbit Ops"
Payload Deploy	Deploy -3 hours	Final separation burn (+1 orbit delay)
Rendezvous/Docking	2 hours prior to first day of rendezvous burn (~crew wakeup)	Hatch opening (+1 orbit delay for contingency)
Rendezvous grapple/retrieve	2 hours prior to first day of rendezvous burn (~crew wakeup)	Payload berthing (+1 orbit delay for contingency)
EVA(s)	EVA egress -1 hour	EVA ingress +1 hour
Selected assembly/activation/check-out tasks	1 hour prior to start of identified period specified in the Mission Flight Rule Annex	+1 hour from termination of identified period specified in Mission Flight Rule Annex
Reboost Ops	3 hours prior to maneuver to reboost attitude	90 minutes after return to nominal attitude
Undocking	Undocking -3 hours	Final separation burn (+1 orbit delay)
Landing	Touch down -5 hours	Weight on Wheels (WOW)

Identifies critical periods

Space Operations Management Office

Certificate Of Flight Projects Directorate Networks Readiness

This is to certify that with successful completion of flight readiness preparations and closure of associated action items, all integrated networks and CSOC elements are ready to support the STS-102/ISS-5A.1/Leonardo

1/25/01
W. Mack/NASA **Date**
Office of Systems Safety and Mission Assurance

01/25/01
J. Walker/NASA **Date**
SOMO GSFC Center Customer Commitment Manager

E. C. Thomas For D. Wagner 01-25-01
D. Wagner/HTSI **Date**
GSFC CSOC Site Manager

1/25/01
T. Sobchak/NASA **Date**
Human Spaceflight Network Director

1/25/2001
S. Norman/NASA **Date**
NISN Representative

1/25/01
J. McKee/DFRC **Date**
SOMO DFRC Center Customer Commitment Manager

Space Operations Management Office

Certificate of Space Operations Management Office Readiness

Pending completion of flight readiness preparations, remaining standard work and closure of all action items, SOMO dedicated elements and all CSOC resources are ready to support the STS-102/5A.1

(Original signed by)

S. C. Newberry **Date**
Director, Space Operations Management Office
Johnson Space Center

(Original signed by)

G. Morse **Date**
Manager, Space Operations Services
Johnson Space Center

(Original signed by)

D. Tighe **Date**
CSOC Program Manager

	Presenter: R. Gest
	Organization/Date: Flt Ops/Date:02/27/01

ISS 5A.1
Flight Readiness Review
2/27/01

USA Flight Operations

AGENDA

Presenter:
R. Gest

Organization/Date:
Flt Ops/Date:02/27/01

- Requirements Compliance
- Facilities Readiness
- Flight Design Readiness
- Flight Preparation Product Readiness
- Training & Certification
- Flight Control Readiness
- Out of Family - None
- Special Topics – OI-28 I-Load Uplink Schedule
- CoFR Statement

REQUIREMENTS COMPLIANCE

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Requirements
  - SSP Requirements Documentation Summary
    - Flight Preparation Requirements Book (FPRB)
      - Generic - CG
      - Flight Specific - 102 MEBASE-AF
  - ISS Requirements Documentation Summary
    - IIDP, 2-FIN-C
  - Waivers & Exceptions
    - None
  - Significant non standard open work
    - None

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Mission Control Center (MCC)
  - Software Summary
    - MCC platform system software release – Io 1.3
      - IO 1.2 released 1/24/01 for STS-98 fixed ISP Null server AR
      - IO 1.3 release 2/28/01E (fixed command server initialization error)
    - MOC Software version – 102B1B
      - Corrected 7 minor AR's
    - ODRC Software version 5.1
      - Incorporates additional GPS comps - 2/21/01
    - MIDDS Application S/W version – 13.2
      - Radar data processing enhancements - 2/21/01
    - Remote Operations Interfaces
      - ASI has been added to ISS data and voice interface
  - Significant Hardware Changes
    - None

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Mission Control Center (MCC) - cont'd
  - Significant Anomalies since last FRR – All new and previous anomalies dispositioned for flight
    - CHeCs Data Dump Time Tag Incorrect for Dumped Data
    - ISS commanding is only critical system affected
    - Impact – While CHECs dump is in progress, ISS command capability will not be available (up to one hour per day)
    - Workaround – If commanding is required, CHeCs data dump will be terminated and rescheduled
    - Long term resolution – CHeCs interface to ISS flight software will be modified for STS-110/8A to correct incompatibility

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Mission Control Center (MCC) - cont'd
  - Data Acquisition Server displays static data
    - Individual parameters become static and do not display "S" notation on displays
    - Eleven total occurrences of problem: STS-106, 1/17/01, 1/18/01, and eight times during STS-98
    - Ops Note written for STS-98
      - Increased awareness of condition and provided user identification queues
      - Display is dropped and re-requested to recover operational data
    - Status: Problem has been identified and is understood. There are two possible methods to fix the error condition.
  - Significant non standard open work
    - Resolve Data Acquisition Server issue

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Mission Control Center (MCC) - cont'd
  - Command Server Initialization Error
    - Error condition allows single commands to be uplinked, however larger command files cannot
    - Condition was uncovered by the release of a new software RECON post STS-98 landing
    - Problem has been identified and the solution will require a baseline software release
    - Status: OI 1.3 baseline is scheduled for 2/28/01 release

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Integrated Planning System (IPS)
  - Significant platform software changes
    - None - IPS Release 10.1 released for STS-98
  - Significant Hardware Changes
    - None
  - Significant Anomalies –
    - Flight Dynamics Planning and Analysis (FDPA) – GNC model corrupts data file when computations include control periods with CMG's inactive
      - Work around developed with users
      - Ops Note in place for STS-102
      - Software fix identified and will be implemented 3/30/01
    - FDPA – intermittent problem that erases user entered data if computation includes more than 50 events
      - Work around requires using less than 50 events
      - Ops note in place for STS-102
    - Significant non standard open work
      - None

FLIGHT DESIGN READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Design meets all NASA requirements (FDRD, FRD, etc.)
  - Limit Exceedances - none
  - Entry thermal analysis complete - no violations
- All anomalies dispositioned
  - Significant Anomaly Reports - none
- Significant mission firsts
  - First use of the additional Uplink I-loads added for OI-28
  - First flight of 122 nm direct insertion
    - Increases probability for FD3 rendezvous.
  - Single –X jet approach and separation
- Significant non standard open work - none

FLIGHT PREP PRODUCT READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Products
  - All Shuttle Recon ARs & PARs have been closed
  - Shuttle Flight Design I-load patches: Standard due to launch date change
  - Shuttle consumables products - delivered or on schedule
  - Significant non standard open work - none
- Procedures
  - FDF and ODF Status – standard open work remains
    - Crew review on 2/22 and ship 3/2

TRAINING & CERTIFICATION

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Crew Training
  - Flight specific Shuttle Crew Training Plan: All training has been or is scheduled to be completed prior to launch
  - Mission First - ISS Standardization proof-of-concept
    - First flight to utilize the generic ISS SMS ascent load for first 2 of 4 ascent simulations
    - Developed flight specific SMS ascent I–load patch
    - Patch used for last 4 weeks of flight specific training
- Integrated Training - on schedule
- All Shuttle instructor and SMTF facility operations personnel are trained and certified

FLIGHT CONTROL READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:02/27/01

- Real-time support software status
  - All user applications that support real-time Ops are certified and incorporated into the Ops baseline
  - Significant Anomaly Reports - none
  - Significant non standard open work - none
- Personnel
  - All USA accountable flight controllers are certified for flight
  - Significant non-standard open work - none

Special Topic – OI-28 I-Load Uplink Schedule

Presenter:
R. Gest

Organization/Date:
Flt Ops/Date:02/27/01

- Background
  - Uplink now includes majority of close to launch mass property and performance sensitive I-Loads
  - Improves SSP manifest flexibility close to launch
  - OI-28 I-Load Uplink could have replaced the Ascent GN&C patches on STS-99, 101, 106, and 92
- Approval and Verification Schedule
  - 4/17/00 - A/E Flight Techniques
  - 12/7/00 - SASCB
  - 12/12/00 – ICB
  - 1/18/01 - SAIL testing and verification complete
  - 2/1/01 - Final PRCB approval
- Implementation
  - Complete uplink functionality was available for STS-98 but was not required to be used
  - STS-102 will be the first use of OI-28 I-Load uplink capability
  - I-loads will be generated beginning at L-30 days, and delivered at L-15 days
  - BRSS-HB will complete independent verification by L-1 week

STS-102/ISS 5A .1

Certification of Flight Readiness

Presenter:
R. Gest

Organization/Date:
Flt Ops/Date:02/27/01

- The USA Flight Operations FRR, NASA MOD FRR, and USA SFOC Pre-FRR have been completed
- All Contractor Accountable Functions (CAF) have been completed, or are scheduled for completion, in accordance with NASA requirements and the applicable portions of the Space Flight Operations contract Flight Preparation Process Plan (NSTS 08117, section 8.5.18 and appendix “R”).
- All required products have been or are scheduled to be delivered per requirements.
- All Facilities have been configured and are ready for mission support.
- All CAF personnel are trained and certified or will be trained and certified prior to flight.
- Flight crew has been trained.
- There are no open issues.
- Pending completion of the defined open work.

USA FLIGHT OPERATIONS IS READY
TO SUPPORT THE STS 102/ISS 5A.1 MISSION

C.Knarr
Deputy Associate Program Manager, Flight Operations

United Space Alliance

STS-102/Stage 5A.1 Mission Operations Significant Items

- Flight Software
  - Shuttle – No significant changes (2nd flight of OI-28)
- Station Flight Software
  - CC MDM's – Update Tlm formats (2C, 2SC, 2SM)
  - PL MDM's – Software updates upon activation, config file updates from POIC for payload activities
  - PPL updates to support DDCU activation
  - RWS – file transfer of checkpoint data and workstation host software

STS-102/Stage 5A.1 Mission Operations Significant Items

- PCS and SSC
  - PCS 5A CSCI Release Version 5A.060 (same as 5A post CCS FSW)
  - EPCS 5A CSCI Release Version e5A.035 available in the event of a restart of CCS from NCS
  - PCS hardware flying on STS-102 for use in Shuttle mid-deck
    - Two 760 XD Laptops (loaded with 5A.060 P1)

      (Spare hard drive and back-up CD)
  - 5A DDCT Patch scheduled to be uplinked prior to shuttle arrival (B/U plan to uninstall shuttle PCS patch in event DDCT's are not updated)

STS-102/Stage 5A.1 Mission Operations Significant Items

- STS-102 Station PCS H/W config remains the same as prior to STS-102. (Next H/W up plan is 7A)
  - Four 760 XD Laptops (3 loaded with 5A, 1 loaded with e5A)
  - One 5A spare hard drive and One e5A spare hard drive
  - One e5A.035 back-up CD and One 5A.060 back-up CD
  - One 5A.060 P1 install CD
  - One 5A recovery CD and floppy kit
- For SSC:
  - Additional H/W to be delivered: 3 personal support drives, 1 expansion chasis, 1 set of printer trays for the back-up printer
  - Post STS-102 config:
    - Seven SSC client laptops
    - One SSC File Server
    - One SSC Router
    - One MACE Silo
    - One CD ROM Library

STS-102/Stage 5A.1 Mission Operations Significant Items

- Flight Design
  - ISS Flight Mechanics Design is complete and meets all requirements
  - Proper definition, insight, and review of shuttle flight design confirms ready for flight
  - Mission objectives have been scheduled reflecting FD 3 rendezvous
  - Prop and non-prop consumables support the mission (12+2)
    - N2 analysis shows slightly negative (-1 lb) – buybacks identified
    - Prop margins: Aft: ~1450 lb; Fwd: ~600 lbs
  - Updated Digital Autopilot for separation due to shuttle plume loads on radiator

STS-102/Stage 5A.1 Mission Operations Significant Items

- Procedures: FDF and SODF
  - Shuttle – No significant open work
  - Station
    - SODF – No significant open work for 5A.1
    - MSFC Payload Operations Data File ready for flight
    - RODF – awaiting Russian payload books – awaiting RSC-E management approval for transfer (three books: Medical Experiments, Biological Experiments, Technological Experiments)
- JOIP
  - US only flight specific completed dated January 12, 2001
  - Joint US/Russian – PCN-4 in work
    - Planning Process updates
    - Payload Interface procedures
    - TV and TLM proc updates
    - Daily prop reports changed to weekly prop reports

STS-102/Stage 5A.1 Mission Operations – Significant Items

- FGB Data Book, SM Data Book, Soyuz/Progress Data Book, and HSG Ops Handbook are ready to support (SM Data Book update 1/31/2001)
- Russian Display Reference Guides – FGB and SM ready to support (no changes from 5A)
- HSG staffing plan similar to previous missions with ops and consultant team.
- MCC Consultant Group
  - Energia
    - Two shift Flight Directors
    - One Planner
    - Two System Specialists
- Plan in place to transition lead control center to MCC-H, including OSTP planning process, at 5A.1

STS-102/Stage 5A.1 Mission Operations Crew and Flight Controller Training

- All shuttle crew training is on schedule to be complete
- EVA NBL training will be complete on 2/27/01
- Remaining STS-102 integrated team training
  - A/E: one ascent sim and one entry (3/1, 3/2)
  - Post Insertion Sim (2/27)
  - Orbit: Complete
  - Alenia has supported three JIS's

STS-102/Stage 5A.1 Mission Operations Crew and Flight Controller Training

- ISS Inc 2 Crew Training – Significant Items
  - All warning and quick response emergency-type procedures trained (onboard proficiency will be required)
  - Nominal mission objectives for 6A, 7A, and 7A.1 have been trained (onboard proficiency will be required)
  - Due to SSTF limitations, SSRMS training was augmented using other facilities
  - Lack of RST in SSTF resulted in limited multi-segment training
  - Based upon recommendations from Exp 1 crew, additional OPS LAN training sessions were provided
- On-board training (ISS)
  - Emergency Procedure Review
  - Avionics Rack 3 deferred task
  - 6A, 7A flight plan and procedure review
  - SSRMS Proficiency in prep for 7A (incl Robotics Onboard Trainer)

STS-102/Stage 5A.1 Mission Operations Crew and Flight Controller Training

- Shuttle - All Flight Controller certifications are scheduled to be complete prior to launch
- ISS Flight Controller Staffing
  - On schedule to meet required 7 certified teams (ADCO may only get to 6 teams at 5A.1 but would add a 7th several weeks into the increment)
  - On schedule for single certified ISS Robotics team at 5A.1
  - For 6A, goal is 3 robotics teams. All sim opportunities and alternate training sources are being pursued to meet 3 teams.

STS-102/5A.1 Annex – Significant Flight Rules

- Mission Objectives/Priorities
  - Crew Rotation
  - Prep for SSRMS Arrival on 6A (Lab Cradle Assembly, Rigid Umbilical, PMA 3 move, robotics Workstation install/checkout)
  - Outfit of US Lab and Re-supply (KU Band – AV Rack 3, CHeCs, HRF, Re-supply Stowage Racks and Platforms)
  - Delivery of On-Orbit Spares (External Stowage Platform, Pump Flow Control System)
- Prop Priorities Defined - consistent with mission priorities
- Docking over Russian Ground Site is Highly Desirable (1st docking with MCS)
- Minimum ISS config for approach and docking defined (400', 30', and docking). Requirements for C&C MDM's, MCS, etc.
- Free Drift at Capture (automatically, crew backup at 20 sec, MCC backup at 40 sec, failed capture at 65 sec)

STS-102/5A.1 Annex – Significant Flight Rules

- Attitude Control Constraints defined (movement of PMA, MPLM) – CMG control allowed for all phases, desaturation inhibits required within 2 ft of structure.
- Reboost Mode Priorities Defined (same as 5A)
- PMA 3 move – available cues: SVS, RMS Digitals, EVA crew; operational plan defined
- Exercise Constraints while docked
- LTA Thermal Constraints developed for XPOP and LVLH
- Power Connection inhibits defined (EVA and IVA connector mate/demate)

STS-102/5A.1 Annex – Significant Flight Rules

- Rules for MPLM (most will migrate to Generic Volume C)
  - Config Requirements (Cabin Fan, Smoke Detector, MDM)
  - While in shuttle bay – MPLM heaters required to be cycled periodically to maintain temp/pressure band between positive pressure relief valves (PPRV) and dew-point requirements
  - When MPLM berthed to ISS – thermostats are used
  - Prior to unberth/berth and Deorbit – warm using shell heaters up to PPRV limits
  - Rules allow use for loss of smoke detection, loss of ventilation, loss of command (battery powered fans/lights as required)
  - Config requirements defined in event MPLM is left on ISS
  - Rack/RSR/RSP configuration requirements defined for unberth of MPLM and return on shuttle

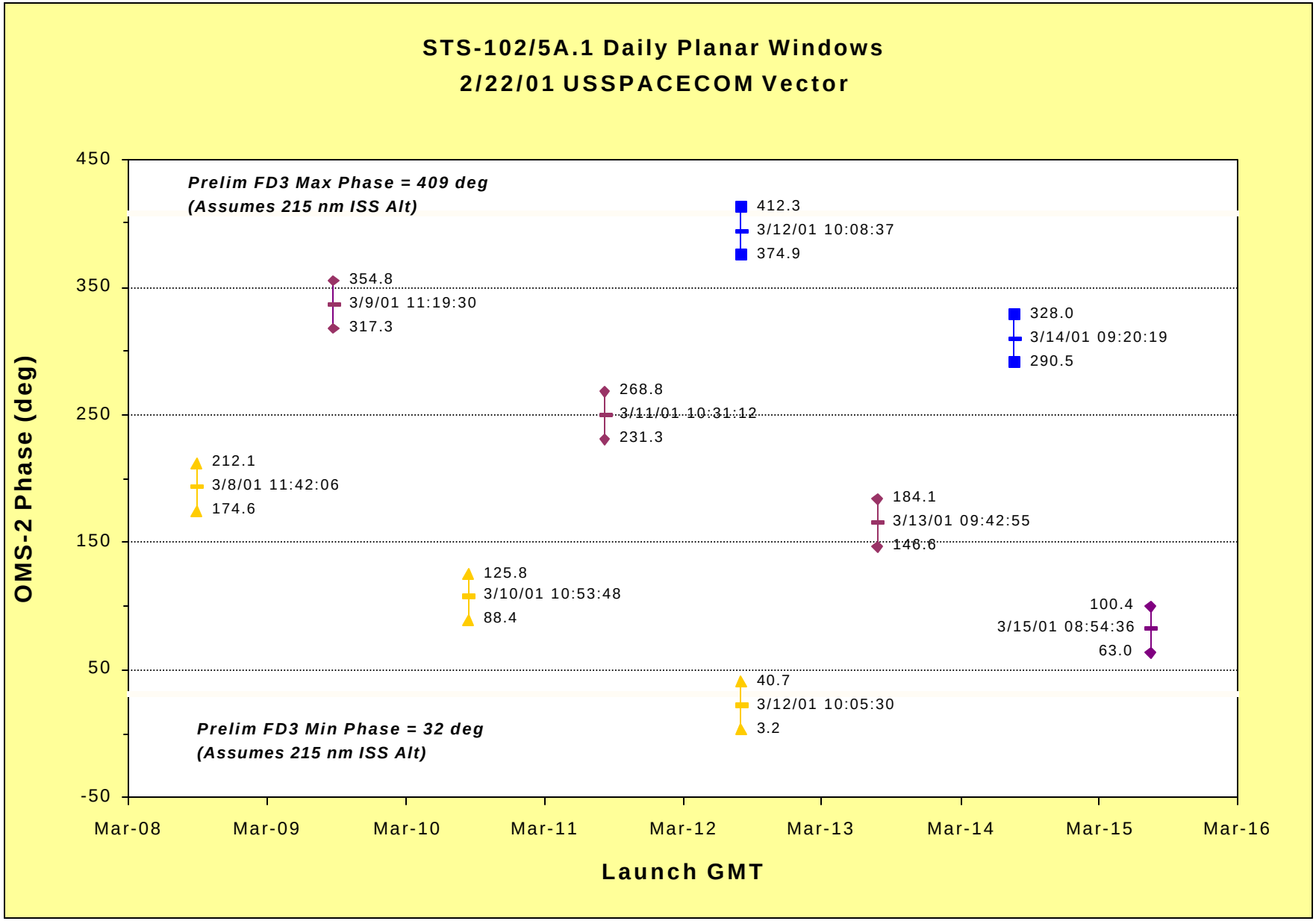
STS-102/5A.1 Ascent Performance

• INSERTION ALTITUDE/INCLINATION	122 NM / 51.6 DEG
• FIRST STAGE DESIGN CRITERIA	DOLILU II / OPS HIGH Q
• LAUNCH WINDOW OPEN (10 MIN) *	March 8, 2001, ~11:37 GMT *
	~06:37 EST *
• LAUNCH WINDOW CLOSE (10 MIN) *	March 8, 2001, ~11:47 GMT *
	~06:47 EST *
• LAUNCH WINDOW (IN PLANE)	March 8, 2001, 11:42 GMT
	6:42 EST
• LANDING TIME (KSC, Dark)	March 20, 2001 ~07:30 GMT
	~02:30 EST
• I-LOAD DESIGN APM	1419 LBS **
• SORR ASSESSMENT APM	1266 LBS **
• FRR ASSESSMENT APM	2700 LBS

LAUNCH HOLD INSIDE OF DRAINBACK LIMITED BY SSME TEMPERATURE START BOX LIMIT, NOT BY ASCENT PERFORMANCE

* LAUNCH WINDOW AND LANDING TIMES WILL CHANGE DUE TO ISS RENDEZVOUS ALTITUDE CHANGE (5A Reboost not accounted for)

** Prior to Removal of EAS


STS-102/5A.1 Daily Planar Windows
2/22/01 USSPACECOM Vector
OMS-2 Phase (deg)
450
350
250
150
50
-50
Prelim FD3 Max Phase = 409 deg
(Assumes 215 nm ISS Alt)
412.3
3/12/01 10:08:37
374.9
354.8
3/9/01 11:19:30
317.3
328.0
3/14/01 09:20:19
290.5
268.8
3/11/01 10:31:12
231.3
212.1
3/8/01 11:42:06
174.6
184.1
3/13/01 09:42:55
146.6
125.8
3/10/01 10:53:48
88.4
100.4
3/15/01 08:54:36
63.0
40.7
3/12/01 10:05:30
3.2
Prelim FD3 Min Phase = 32 deg
(Assumes 215 nm ISS Alt)
Mar-08
Mar-09
Mar-10
Mar-11
Mar-12
Mar-13
Mar-14
Mar-15
Mar-16
Launch GMT

Special Topic – Direct Insertion to 122 NM

- Shuttle orbital insertion design to 122 nm x 85 nm significantly increases FD 3 Rdz launch opportunities

Dir Ins Alt	FD3 Phasing	Days wi FD 3 Launch Window *	
173 x 85	283 deg	81%	(assumes 215 nm ISS alt.)
122 x 85	375 deg	100 %	(assumes 215 nm ISS alt.)

(* In some cases may only be a partial window – i.e. not full 5 min. window)

- Requires ~3000 lb additional OMS -- resulting in ~300-500 lb performance loss
- ET Disposal Area shifts from NE of French Polynesia to SW of French Polynesia resulting in the following protection from 3-sigma ET footprint:
  - New Zealand: 200 nm
  - French Polynesian Islands: 60 nm xtrk, 140 nm downrange (prob < 10 e-10) (note – US territory, incl continental US -- reqmnt is 25 nm)
- International coordination with Tahiti (French Polynesian Islands) and New Zealand has cleared footprint
  - French and New Zealand civil air authorities added to Eastern Range messaging

STS-102/5A.1 Significant Open Issues

- RODF (Payload Procedures) Delivery from Energia is still open
- Waste dumps while docked
- MPLM hatch MLI cover for undock
- 4 Bar linkage EVA task – being evaluated
- Data acquisition problem in MCC

MISSION OPERATIONS DIRECTORATE
SHUTTLE CERTIFICATE OF FLIGHT READINESS (CoFR)
FLIGHT: STS-102/5A.1 REQUIREMENTS

Critical Processors/Applications, Non-Crit Processors/Applications; Flight Rules: EMCC: Trng-MCC /POCC; FTP-New Operations; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Exception Resolution; CMD Proc; FPPP Requirements Met; Contractor Process Insight	DA8/Chief, Flight Director Office
Crit Processors/Applications; Non-Crit Processors/Applications; FDF; EMCC; TRNG-MCC/POCC; LCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; FPPP Requirements Met; Contractor Process Insight	FOR DF/Chief, Systems Division
Crit Processors/Applications; Non-Crit Processors/Applications; FDF; EMCC; RECON-Flight S/W (MMU); TRNG-MCC/POCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Level II Actions; Mission Requirements; CMD Proc; FPPP Requirements Met; Contractor Process Insight	2/1/01 DM/Chief, Flight Design and Dynamics Division
Crit Processors/Applications; Non-Crit Processors/Applications; FDF; FDF Manage; EMCC; PGSC; TRNG-MCC/POCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; FPPP Requirements Met; Contractor Process Insight	FOR DO/Chief, Operations Division
EX/AI from Prior Reviews; No Constraints; Level II Actions; Mission Requirements; FPPP Requirements Met; Contractor Process Insight	DT/Chief, Space Flight Training Division
FPPP Requirements Met; Contractor Process Insight	for DV/Chief, Advanced Operations & Development Division
FAC-NBL; FAC-SVMF; FDF; TRNG-Crew Trng; TRNG-MCC/POCC; TRNG-EVA/MARS; LCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; EVA Hardware Integration; Contractor Process Insight	for DX/Chief, EVA, Robotics, & Crew Systems Operations Division
FAC-MCC; FAC-Network Interface; FAC-SMS; FAC-SPF; FAC-IPS ; Crit Processors/Applications; Non-Crit Processors/Applications; FD-Trajectory; FD-Consumables; FD-PDRS; FD-Analyst Cert; FD-CTF; FDF Manage; EMCC; RECON-STAR/MASTII/CD ROM Products; RECON-MCC; TRNG - Crew Trng; TRNG-MCC/POCC; TRNG-SMS; FTP-New Ops; Flight Anomaly Res; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; Exception Resolution; CMD Proc; FPPP Requirements Met	for Associate Program Manager, Flight Operations, SFOC
EMCC; NETWORK; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Level II Actions; FPPP Requirements Met	2/1/01 Network Director, Shuttle, GSFC
	Mission Operations Director

MISSION OPERATIONS DIRECTORATE
ISS CERTIFICATE OF FLIGHT READINESS (CoFR)
FLIGHT/INCREMENT: STS-102/ 5A.1 AND SUBSEQUENT INCREMENT OPERATIONS

ISS REQUIREMENTS

Critical Processors/Applications; Non-Crit Processors/Applications; Flight Rules; EMCC; Trng-MCC /POIC/POCC; JOP-New Operations; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Program Actions; Mission Requirements; Exception Resolution; CMD Proc; Contractor Process Insight	DA8/Chief, Flight Director Office
Crit Processors/Applications; Non-Crit Processors/Applications; ODF/SODF; EMCC; TRNG-MCC/POIC/POCC; LCC; JOP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Program Actions; Mission Requirements; CMD Proc; EVA Hdwr; Contractor Process Insight	DF/Chief, Systems Division 2/1/01
EX/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; Contractor Process Insight	DL/Chief, Flight Avionics Division 2/5/01
Crit Processors/Applications; Non-Crit Processors/Applications; TRNG-MCC/POIC/POCC; JOP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; CMD Proc; FD-Flight Mechanics, FD-Analyst Cert. FD-CTF	DM/Chief, Flight Design and Dynamics Division 2/1/01
Crit Processors/Applications; Non-Crit Processors/Applications; ODF/SODF; ODF/SODF Manage; EMCC; TRNG-MCC/POIC/POCC; JOP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Program Actions; Mission Requirements; CMD Proc; Contractor Process Insight	for DO/Chief, Operations Division
EX/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; Contractor Process Insight	DT/Chief, Space Flight Training Division
The SSTF maintains a training load consistent with the last training environment for the increments in progress which can, on demand be loaded and updated to the required onboard configuration for any necessary procedure development; contractor process insight.	for DV/Chief, Advanced Operations & Development Division
FAC-NBL; FAC-SVMF; FDF; TRNG-Crew Trng; TRNG-MCC/POCC; TRNG-EVA/MARS; LCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; EVA Hardware Integration; Contractor Process Insight	for DX/Chief, EVA, Robotics, & Crew Systems Operations Division
FAC-MCC; FAC-Network Interface; FAC-IPS; Crit Processors/Applications; Non-Crit Processors/Applications; ODF/SODF Fabrication; Flight Anomaly Res; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; Exception Resolution; CMD Proc	for Associate Program Manager, Flight Operations, SFOC
NETWORK; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Program Actions	Network Director, SSP-ISSP, GSFC 2/1/01
	Mission Operations Director

STS-102/5A.1 FLIGHT READINESS STATEMENT

THE MISSION OPERATIONS FLIGHT PREPARATION PROCESS PLAN DOCUMENTED IN NSTS 08117, REQUIREMENTS AND PROCEDURES FOR CERTIFICATION OF FLIGHT READINESS, HAVE BEEN SATISFIED. REQUIRED PRODUCTS AND OTHER RESPONSIBILITIES FOR MISSION OPERATIONS (NSTS 08117, SECTION 8, PARAGRAPH 8.5.7) HAVE BEEN OR WILL BE PRODUCED OR COMPLETED. ALL AREAS ARE READY. MISSION OPERATIONS IS PREPARED TO SIGN THE CERTIFICATE OF FLIGHT READINESS FOR STS-102/5A.1.

J. W. BANTLE
MISSION OPERATIONS DIRECTOR

C. L. VERMILYEA
VICE PRESIDENT AND ASSOCIATE
PROGRAM MANAGER, FLIGHT
OPERATIONS, SPACE FLIGHT OPERATIONS
CONTRACT